soil, and it is possible that, on account of lag in the soft soil, the shear in the underlying rock stratum is larger.

Many interesting questions are raised as to disturbances in boundary lines between farms, in latitudes, azimuths, etc.

The same geological fault extends southeasterly throughout the State to the vicinity of the Colorado River, and perhaps further.

W. W. CAMPBELL.

THE CALIFORNIA EARTHQUAKE AT UKIAH.

The great earthquake of April 18th was very severe at Ukiah, 160 kilometers (96 miles) northwest of San Francisco. Many chimneys were thrown down and three brick buildings were partially wrecked. There were a series of shocks and reliable estimates of their duration vary from twenty seconds to one minute. The general direction of the waves seemed to be from the south to the north, although on the eastern side of the valley the damage to the buildings of the State Insane Asylum seemed to be almost entirely from the east and west movement.

At the Latitude Station no damage whatever, was done. The observatory clock, which faces south, was not stopped, but it lost six seconds during the disturbance, which is equivalent to being stopped for that length of time and then set to going again. The pier upon which the zenith telescope rests, is apparently not damaged, but the telescope was thrown considerably out of adjustment. It was out about fifteen seconds of arc in azimuth and the vertical axis was out in both directions, but not much more than sometimes results from extreme changes in temperature.

The first series of shocks was followed by three lighter ones, and the observed data for each are as follows:

Pacific Standard Time of Beginning	Duration	Direction	Intensity Rossi-Forel Scale
1906, April, 18d 5h 12m 17s a. m.	About 40s.	S. W. to N. E.	VIII. to IX.
18d 10h 4m 39s a. m.	About 10s.	S. W. to N. E.	IV.
18d 11h 39m 00s a. m.	About 30s.	S. W. to N. E.	III.
20d 12h 30m 53s a. m.			I.

The first time given is uncertain to the extent of five seconds, possibly more, either way. The other times are correct within two, or at the most, three seconds.

I was in the observatory at the time of the second series of shocks, at 10h 4m, and perceived the effect of the movement in the striding level, (east and west) of the zenith telescope. The bubble oscillated over about two divisions of the

level. The value of one division is 2.2″ and as the distance between the east and west leveling screws of the instrument is about 42 centimeters, the disturbance observed in the bubble was equivalent to the effect of raising and lowering one of the leveling screws, by 0.0005 centimeter. This shock was felt very distinctly and it is probable that the north and south component of the motion was much greater than the east and west one.

The fourth shock was not felt at all. It was detected during the progress of latitude observations by a movement of the bubbles of the latitude levels. The oscillation (north and south) was about one-half of one division, and the value of one division is 1.0″.

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SEISMOLOGICAL STATIONS IN CALIFORNIA.

The need of several well equipped seismological stations in California has long been felt and has become more pressing through the recent earthquake and the desirability of accurate observations of the after-shocks. Several Duplex seismographs for recording the horizontal motion of the Earth's crust have been in operation in various parts of California for a number of years. But the only instruments available for recording the time element and the vertical component are two Ewing seismographs of which one is installed at the Lick Observatory and the other at the Students' Observatory. The chief disadvantages of these instruments are that they do not magnify the motion sufficiently, that they are not sufficiently sensitive and that the records are not continuous, the clock and disc being started by the shock. The Students' Observatory also has an old style seismograph of the Gray-Milne pattern, which originally gave a continuous record. But owing to the lack of an assistant to give it the constant care it requires, the instrument was altered some years ago so as to start with a shock, and later it was entirely abandoned. Since the earthquake of April 18th, it has been overhauled for want of a better instrument, and is now in operation. With the meager apparatus at their disposal, the Lick and the Students' Observatories, are, however, constantly securing such records as may be obtained. It might be mentioned here that aside from systematically observing earthquakes, these two observatories also keep a